

JAN 27 1925

REQUEST FOR RETURN OF COPYRIGHT DEPOSITS

Dated at Washington, D.C.

January 23, 1925

Register of Copyrights,  
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Washington, D. C.

Dear Sir:

The undersigned claimant of copyright in the work herein named,  
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If this request can be granted you are asked and authorized to send the said copy or copies to me at the following address: Ford Motor Company  
451 Penna Ave N W Washington, D C ( Will Call ) or  
to \_\_\_\_\_  
at \_\_\_\_\_

Signed Ford Motor Company  
by Adv. Dept. [Signature]  
(Claimant of Copyright)

(Sept., 1922—500)

Received two copies of the above film

Ford Motor Company

By

[Signature]

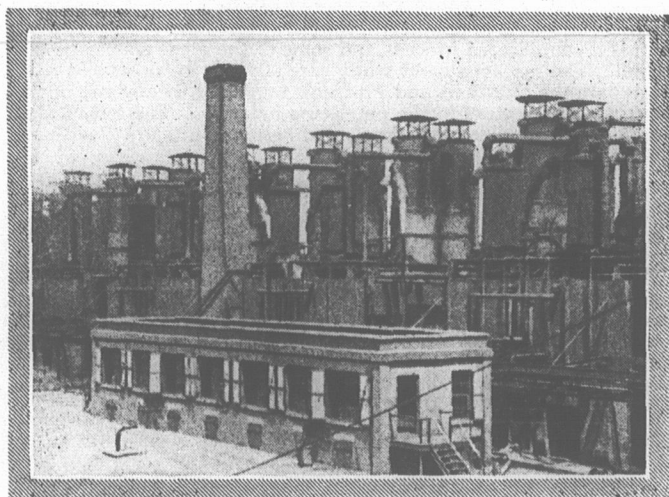
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# Ford Educational Library

## Technical

(47) Modern Oil Refining



Produced & Distributed  
by

**Ford**  
MOTION PICTURE  
LABORATORIES

DETROIT, MICHIGAN

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# Ford Educational Library

## Technical (47) Modern Oil Refining

### GENERAL STATEMENT.

Petroleum is the magician which supplies a large number of necessities to modern industry. It is a fuel, a lubricant and a power generator. Petroleum is the only source of fuel for the combustion engine which is the great mechanical development of the twentieth century. The automobile, the tractor, the areoplane, the motor boat and the stationary engine illustrate the importance of petroleum products. The entire southwestern portion of the United States is wholly dependent on oil for fuel and power. Our navy is upon petroleum basis.

Petroleum supplies energy to 10,000,000 automobiles in this country alone. Each machine consumes annually 200 gallons of gasoline and the tractors 2,000 gallons. Each car is dependent absolutely upon petroleum for its fuel and the lubricants. This fuel has enabled man to fly, to have rapid transportation for the individual, to replace heavy manual work with the small engine and decreases farm labor. It is estimated that each person has the use, of what is equivalent in machinery to twenty able bodied men. All high speed machinery requires a lubricant that only petroleum supplies. The film presents the petroleum story from drilling the well to the completed products.

### FILM PRESENTATION.

In presenting this film lesson of petroleum, the class must have some preliminary preparation. Refining petroleum is a complicated process and some of the ideas should be discussed previous to the use of the film. The teacher should study carefully this synopsis and read the references. The class should prepare the questions and problems suggested, read some of the references and devote several meetings of the class to the petroleum industry. The technical character of this reel is simple enough for the elementary schools and better results are always secured when this reel is repeated in the classroom.

### QUESTIONS AND PROBLEMS.

1. What is petroleum?
2. Where is petroleum found?
3. How is petroleum obtained?
4. What is a "field"?
5. How is an oil well made?
6. What is the cost of an oil well?
7. Do all oil wells yield petroleum?
8. How deep are oil wells drilled?
9. Why are 85 per cent of the wells dry?
10. When oil is found, how is it carried to the refinery?
11. What is a "tank" car?
12. What is the purpose of a pipe line?
13. How is petroleum divided into its different products?
14. What are the different temperatures at which the products are given off?
15. When the vapors are driven off from petroleum, how are they condensed?
16. How is the oil purified?
17. What is petroleum coke?
18. How is the wax or paraffine obtained from crude oil?
19. Why is gasoline more in demand than kerosene?
20. How are oils like kerosene and gasoline shipped?
21. What is a "tanker"?
22. To what countries is oil exported?
23. Why is crude oil our most valuable resource?

### REFERENCES.

1. The American Petroleum Industry—Bacon and Hamor.
2. Oil—The New Monarch of Motion—McBeth.
3. Economics of Petroleum—Pogue.
4. America's Power Resources—Gilbert and Pogue.
5. Industrial and Commercial Geography—Smith.
6. Petroleum Production—Suman.
7. The Oil Conquest of the World—Talbot.
8. Story of Oil—Tower.

### TITLES OF SCENES

(The heavy type represents the film title for the following scene. In the brackets beneath each title are a few comments to aid in making clear the action of the scene. Thees suggestions may be used at the discretion of the teacher.)

**Crude oil or petroleum is a natural resource, which, when refined, yields kerosene, gasoline and many by-products.**

(Petroleum is a natural resource of vast importance in modern commerce. The United States produces 65 per cent of the world's supply. California and Oklahoma are the two great petroleum states. Every industry uses petroleum in some form.)

**Petroleum occurs deep in the earth in layers of porous rocks.**

(Petroleum is a liquid which has slowly accumulated throughout the ages in the rocks of the earth's crust. It is found by geologists who locate it by the rock structures.)



**The large oil pools are found by drilling.**

(Only by drilling deep wells are the pools located.)

**Drilling for oil. The derricks contain the drilling machinery.**

(In any oil region where drilling is active, there are many steel or wooden derricks erected. The tall derrick is necessary in handling the long lengths of pipe.)

**The tall derricks are built of heavy timbers or steel pipe.**

(Each derrick must be strong enough to handle heavy steel pipes. The derrick is constructed of timbers which can be put together and taken apart when it is necessary to move the drilling outfit.)

**On the Pacific coast, oil drilling is sometimes done in the ocean water.**

(This may seem strange, but each oil well is drilled from 3,000 to 4,000 feet deep. The water here is less than 20 feet deep. Hence, drilling in water is not difficult.)

**In California some of the oil wells are in the city of Los Angeles.**

(In California large oil fields have been located in the southern part of the state. Some wells have actually been found within the limits of Los Angeles. Without coal, abundant oil means fuel for industries.)

**This field of crowded derricks, is situated over a rich oil pool.**

(When oil has been located and the hole is to be drilled, the derrick is constructed first. This usually takes six men about five days to construct. If the pool is a rich one, many derricks will be constructed.)

**An important oil tool is the heavy steel drill or bit. It is being sharpened to cut through the rocks.**

(The steel bit which is being sharpened is fastened to a heavy piece of metal on the end of a cable. It is raised and dropped. The jar shatters and breaks the rock. The hole is worn through the different rock formations in this manner. Sometimes 50 to 60 feet is drilled daily. These steel bits have to be sharpened after working for a time as they become blunt and dull.)

**Putting the fish-tail bit into the drill hole.**

(The steel drill makes an opening in the rock a little larger than the steel casement. The casing is driven or dropped down as the hole is drilled.)

**Raising and dropping the drill cuts the rocks.**

(The drill is raised and dropped by means of a cable. The cable method of drilling a well is somewhat slower but cheaper than the rotary drill. The small rock pieces are forced upward in the pipe by means of a pump.)

**The most modern method is a rotary drill which bores through the rocks.**

(This drill works like an auger and cuts best in the softer rock. It is used in harder rocks and has displaced the cable drill.)

**A heavy pipe is forced down into the drill hole.**

(All oil wells are lined with a heavy steel pipe. This keeps out sand, water and gas which might interfere with the flow of oil. The heavy pipe is forced down section by section as the drill cuts the hole.)

**At 2,300 feet or more, oil is found in the muddy water coming from the well.**

(The experienced drillers know the different formations through which the drill passes, and usually can tell within a foot or two, the distance to the oil bearing formation. The water and mud which come from the well are very carefully tested from time to time for indications of oil.)

**Testing the oil.**

(A well costs from twenty to fifty thousand dollars and all concerned are anxious to strike oil. Nearly 95 per cent of the wells drilled are dry holes.)

**"Shooting" a well by exploding nitro-glycerine in the oil sand. Placing the charge.**

(When the oil-bearing formation is reached, if the oil does not flow to the surface, the rock formations are shattered so that the oil may flow freely through the pipe. To shatter the rock, a charge of nitro-glycerine is exploded at the bottom of the well. This liquid after being lowered is exploded by a weight being dropped upon it.)

**After the explosion the oil flows upward and causes a "gusher."**

(This is a dream of every oil driller. Some wells in the United States have flowed 20,000 barrels a day. In Mexico, one well flows 100,000 barrels daily. A well flowing 500 barrels daily, will make its owner rich. This well flows about 100 barrels a day.)

**At the top of the well many valves control the rushing oil.**

(When once found, the oil is carefully preserved. Before shooting the well, very careful arrangements are made to control it. Even so, the gushers are so strong, that sometimes the pipes are blown out of the wells.)

**Building temporary tanks to store the oil.**

(Before the well is shot, tanks are built to care for the production. Oil has sometimes been stored by digging a large depression in the ground. This latter method of storing is only temporary. In the modern oil field, steel tanks, such as are shown are erected where considerable oil is obtained.)

**Crude oil is pumped from the wells to the refinery through pipes thousands of miles in length.**

(It would be impossible to market or send the oil to the refinery, if it were not for the pipe lines. When a new oil field is opened and many wells are drilled, pipes must be laid to carry the crude oil to the refinery.)

**Digging trenches for pipe line.**

(Large gangs of men are employed to dig trenches and lay the pipe. This work must be done rapidly or the oil which has been found may be wasted.)

**Laying the pipe.**

(The pipe is laid quickly and at the present time pipe-lines form a network connecting the Great Lakes, the Gulf and the Atlantic sea port cities.)

**A pipe-line in the mountains.**

(The pipe-lines extend over mountains, under rivers and transport the oil at low cost. Branch pipe-lines connect the different oil fields and the oil is pumped under pressure many thousand of miles.)

**Millions of feet of pipe are used in the oil fields.**

(Many miles of steel pipes are laid in the ground, for the purpose of transporting oil from the field to the refinery.)

**Tank cars carry some of the crude oil to the refinery.**

(Tank cars are not commonly used, but one company has 137,000 tank cars in operation. These are used when it is desired to refine oil without mixing it with many other oils.)

**Crude oil is shipped from Mexico by "tankers" or ships of 45,000 barrels capacity.**

(Crude and other oil products are shipped in these steam ships which are called oil "tankers." Practically all of the kerosene and gasoline are shipped abroad by means of these steam ships.)

**Steel storage tanks at the refinery hold 100,000 gallons.**

(The storage tanks are built of steel and are designed to hold the crude oil until wanted. It is necessary to have at the refinery a tank city, as shown, to store the large stock of raw material.)

**The moat of water is a fire protection.**

(Note that around the tank is a deep ditch or moat filled with water. This is to serve as a protection in case of fire. It would prevent the spread of fire from one tank to another. During the hot days, gasoline tanks are sprayed with water. Why?)

**Crude oil, in the still, is divided by heat into gasoline, fuel oil, lubricating oil and many by-products.**

**The stills.**

(The still is a large tank. These are the tower stills which consist of a large vat in which the crude oil is placed. Heating the still, causes the crude oil to give off at various temperatures different products.)

**The still at work.**

(This diagram shows the different temperatures at which the volatile parts of the crude oil are distilled off. The operation of the still is clearly shown.)

**Each still holds 13,600 gallons or one day's run.**

(It requires a day and sometimes longer to distill the crude oil and vaporize the different products.)

**Cleaning out the coke or residue from the still.**

(After all the volatile matter has been distilled off, petroleum remains as a residue in the bottom of the still. This coke is formed into a solid mass and is difficult to remove from the still. This hot work is done by men who have their feet and faces wrapped for protection from the intense heat. Petroleum coke is a valuable product for fuel and has other uses.)

**The first vapor from the still is condensed into gasoline. It passes through these "look boxes" where it is tested by hydrometers.**

(When the volatile matter is distilled off from the petroleum, the different vapors pass into a condenser. This consists of coils of pipes in cold water and the vapor is condensed into a liquid. The first vapor from the crude oil is gasoline which is passing through the boxes and is being tested.)

**The impurities in gasoline are removed by use of sulphuric acid in the agitators.**

(The agitator cleans and whitens the gasoline and kerosene. Sulphuric acid and alkali are used.)

**Shipping 100,000 gallons of gasoline to Europe by "tank" steamer. Loading from floating dock.**

(The gasoline for export is shipped abroad in these tank steamers, which carry a cargo of nearly 100,000 gallons. The steamer may be loaded in a relatively short time by the pipes which are placed on the floating docks. Freight boats of this type, use a short time for loading or unloading the oil cargo.)

**pe-lines to dock.**

(All great refineries along the sea coast, have large storage tanks for the purpose of holding the surplus for shipping abroad. During the World's War, oil was supplied largely by the American tankers.)

**In this country, 100,000,000 barrels of gasoline are used annually for power.**

(The large number of automobiles derive their power from gasoline. The power developed by gasoline is twice that developed from coal.)

**Kerosene is the second important product from petroleum. It must not flash at a temperature below 110 F. The test.**

(Kerosene is shipped widely all over the world. Kerosene must not explode at low temperature. This is the flash test. It reaches natives in distant lands who are protected by this test.)

**Grease from petroleum gives lubrication to machinery.**

(All high speed machinery requires petroleum lubrication. Hence, petroleum is of great value as it furnishes a lubricant that cannot be obtained from vegetable or animal substances.)

**Wax or paraffine is a petroleum by-product.**

(Wax is a by-product of petroleum which is used in making candles. All lubricating oils are made from paraffine distillate. The oil is separated from the wax by chilling and pressure.)

**Petroleum provides the chief motor fuel, a common light, a lubricant for machinery and many important by-products. "It is a priceless resource that can never be replaced."—Franklin K. Lane.**

(The story of oil is one of service to modern life. The oil history is one closely related to the transportation development. Oil is the magician which has transformed the crude roads of yesterday into the smooth highways of today.)

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